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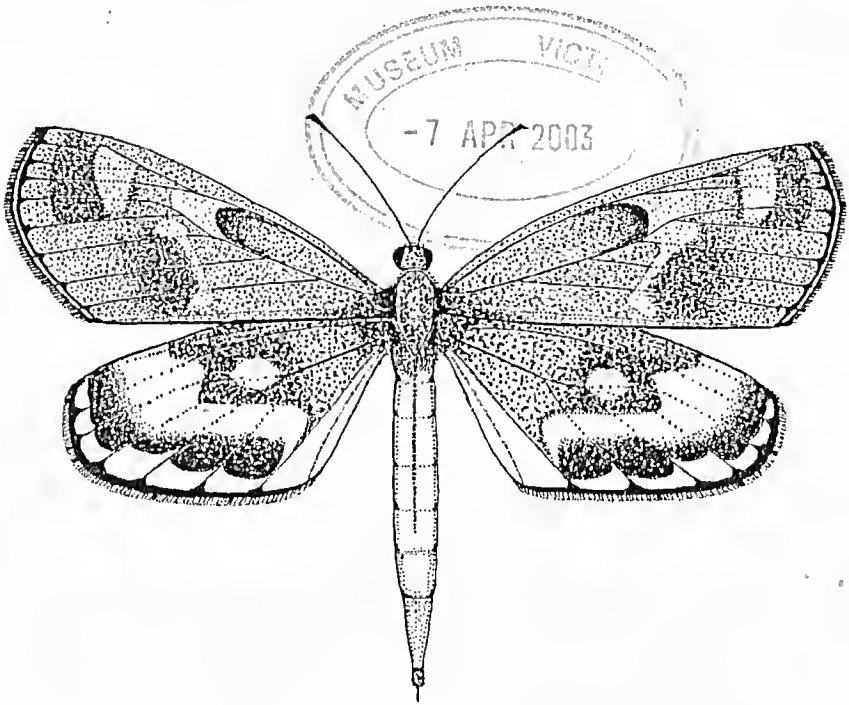

News Bulletin of The Entomological Society of Victoria Inc.

THE ENTOMOLOGICAL SOCIETY OF VICTORIA (Inc)

MEMBERSHIP

Any person with an interest in entomology shall be eligible for Ordinary membership. Members of the Society include professional, amateur and student entomologists, all of whom receive the Society's News Bulletin, the Victorian Entomologist.

OBJECTIVES

The aims of the Society are:

(a) to stimulate the scientific study and discussion of all aspects of entomology,
(b) to gather, disseminate and record knowledge of all identifiable Australian insect species,
(c) to compile a comprehensive list of all Victorian insect species,
(d) to bring together in a congenial but scientific atmosphere all persons interested in entomology.

MEETINGS

The Society's meetings are held at La Trobe University, 2nd Floor, Room 2.29, 215 Franklin Street, Melbourne (Opposite the Queen Victoria Market) Melway reference Map 2F B1 at 8 p.m. on the third Friday of even months, with the possible exception of the December meeting which may be held earlier. Lectures by guest speakers or members are a feature of many meetings at which there is ample opportunity for informal discussion between members with similar interests. Forums are also conducted by members on their own particular interest so that others may participate in discussions.

SUBSCRIPTIONS

Ordinary Member	$20.00 (overseas members $22)
Country Member	$16.00 (Over 100 km from GPO Melbourne)
Student Member	$12.00
Associate Member	$ 5.00 (No News Bulletin)

Associate Members, resident at the same address as, and being immediate relatives of an ordinary Member, do not automatically receive the Society's publications but in all other respects rank as ordinary Members.

Cover design by Alan Hyman.

Cover illustration: The pale Sun Moth, *Synemon selene* Klug, is an endangered species restricted to perennial grassland dominated by *Austrodanthonia* in Western Victoria. It is now extinct in SA, and was presumed extinct in Vic. until its rediscovery, in February 1991, by the late Frank Noelker and Fabian Douglas. The Victorian Populations are parthenogenetic with all specimens comprising females, a most unusual trait in the Castniidae. Illustration by Michael F. Braby.

MINUTES OF THE COUNCIL MEETING, 23 NOVEMBER, 2002

Meeting opened 4. 10pm

Present: D. Dobrosak, 1. Endersby, A. Kellehear, D. Stewart, J. Tinetti, P. Carwardine

Correspondenee:
Anthony Liddy, who reeently reeeived a bursary sent a letter of thanks

Treasurer's Report:
The Society's term deposit has matured and will be reinvested

Editor's Report:
Articles for the February edition are weleome

General Business:

1. There was a general diseussion to confirm speakers for meetings
2. A deeision regarding The Le Souëf Award for 2002 and will be made before the next General meeting
3. Thanks to Alan Kellehear for today's exeursion to Glenluee. A report will be made at a future meeting.

Meeting elosed 4.20 pm.

THE GENERAL MEETING, 21 FEBRUARY, 2003

There are no formal minutes for this meeting. It was an exeursion to the Melbourne Museum. Our thanks to Ken Walker and Peter Lillywhite for making the venue available and hosting a very informative visit to the entomology eolleetion as well as a rare opportunity to see the baek-of-house area where investigations are being made on rearing inseets for a future Museum exhibit ineorporating live invertebrates.

MINUTES OF THE COUNCIL MEETING, 21 MARCH, 2003

Meeting opened 8. 10pm.

Present:, I. Endersby, A. Kellehear, D. Stewart, J. Tinetti, P. Carwardine

Apologies: D. Dobrosak

Correspondence:
Listing advice from Australian Business Directory
An entomological equipment list from the Czech company, Morpho
Australian Journal of Entomology Vol.2, No 1

Treasurer's Report:
The Society's books are with the auditor. The audit is complete and no problems have been identified.
The Commonwealth Bank has advised that it no longer classifies the Society as a charitable organization. Therefore accounts will incur fees. I Endersby will investigate further and express concern.

Editor's Report:
The editor would like more material. Please note that this year Good Friday falls on our usual meeting date. Therefore the April Annual General meeting will be a week earlier on Friday April 11

General Business:

1. Election of officers.
At the AGM, the role of council will be outlined for members
A letter will be sent to all members within convenient travelling time of the meeting to encourage attendance at the AGM
Nominations for Council and Executive have been called and will be called for again at the AGM. Even if you have no interest in being on council please come along.
At the next general meeting, K. Walker and R. Field will be nominated for life membership, in recognition of their contribution to our Society
2. Speakers
Members at the AGM will be ask for suggestions re speakers for August and October meetings
3. Le Souëf award
A nomination has been received and is being actively considered.

4. P. Carwardine offered congratulations on the newsletter cover illustration.

Meeting closed 9.45 pm.

The Search for *Argynnina cyrila* (Satyrinae), *Paralucia aurifera* (Lycaenidae) and *Pasma tasmanica* (Hesperiidae) in Southwest Victoria and Southeast South Australia.

R. GRUND and L. HUNT*
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*2 Chelmsford Avenue, Mitcham, Adelaide, S.A., 5062

It has been known for many years that *Argynnina cyrila* (Hunting. 1981) and *Paralucia aurifera* (Crosby, 1989) occurred in southwest Victoria, but had not been found in the adjacent areas of South Australia (Grund and Hunt, 1997).

It was the authors' intention to locate these butterflies in southwest Victoria and examine the habitats in which they occurred to determine if similar habitats existed in SA.

Two days were spent by Grund doing the survey on 9-10 November 2002, who found both butterflies in Victoria, but in addition also found *Pasma tasmanica*. The period was fine and warm (19 C).

Argynnina cyrila was found in the places mentioned by Hunting, but was also seen hilltopping at Mt Richmond. At the latter place and in the Cobboboonee State Forest the butterfly was rare. However, in the Hotspur State Forest the butterfly was common, where the females occurred in a new condition while the males were in a slightly worn condition indicating an earlier emergence. The females stayed near the ground, whereas the males had territories on tall understorey bushes from where, with the least provocation, they flew up into the forest canopy.

Paralucia aurifera was seen in the Cobboboonee State Forest where it was also locally common, with both new males and females flying. Only a single fertile, new female of *Pasma tasmanica* was seen, which occurred in the Hotspur State Forest accompanying *Argynnina cyrila*. It was flying late in the day near the ground in a sunny, open grassy area within the forest.

In nearly all the localities where these butterflies occurred the habitat was moist (high rainfall >750 mm), mossy forest, in which the ground was covered in *Microlaena*/*Poa* (Poaceae) type grasses in which leeches frequently occurred. The understorey was open and mostly free of bracken, and the grasses (particularly *Microlaena*) were well cropped by the resident native animal fauna. The localities were mostly elevated and well drained along ridges, and the soil was heavy grey loam. The high rainfall requirement was obviously a necessary requirement for both *A. cyrila* and *P. tasmanica* to provide green grass that remained in a soft growing condition throughout summer while their larvae fed.

Such elevated habitat is rare in adjacent areas of SA. Most of the lower Southeast Region of SA is low and flat with soils that are either sand, or heavy, poorly drained grey loams. The forests are mostly low forest types with an understorey that is now invariably choked with bracken. However, elevated habitat areas similar to the Victorian localities do exist. These areas include the remnant volcanic areas of Mt Burr and Mt Gambier, and the north-south Naracoorte Range that occurs between Naracoorte and Piccaninnie Ponds, and the east-west Woakwine Range that occurs between Robe and Piccaninnie Ponds. These two ranges contain localized areas of heavy red soils overlying limestone that are frequently targeted by the wine industry for grape growing. All these areas have either been mostly cleared of native vegetation or planted out to pine forests. The high rainfall requirement would limit the potential SA localities to the extreme southeast portion of the region, mostly southeast of Mt Burr.

Several of the high rainfall, heavy loam native forest remnants occurring in SA near the Victorian border were briefly examined during the field survey, but none of the above butterflies were present. However, there are other suitable habitat areas (albeit small) present in SA for the above butterflies that were not examined and so there is still a slight possibility that these butterflies will eventually be

found to occur in SA. The low probability of now finding the butterflies in SA is due to the small areas of remaining habitat having original native vegetation, and as most of these vegetation remnants have historically suffered frequent burn-offs, the fragmentation of these areas is likely to have prevented a recolonisation by the original resident butterflies.

One conclusion learnt from the survey is that more attention should be given to the undertaking of surveys in this area during spring, even though most of the days are wet or cold.

During the survey, females of the three species were collected and allowed to lay eggs on their known foodplants. The life histories for these species have already been documented, however nothing is known about their early stages or requirements in this part of Australia so it was of interest for the authors to ascertain this information.

A female *Argynnina cyrila* was seen to lay eggs in the Hotspur Forest on *Microlaena stipoides*. It fluttered near the ground then briefly landed on the kangaroo-cropped grass and laid a single egg before flying off again. Other single eggs were noticed near to this egg as a result of previous layings by the same or other females. The green coloured eggs were firmly attached to the grass. In captivity the females readily laid eggs on a variety of grasses over the period 11-23 November. These began hatching after 8 days and it was noticed that there was a partial delayed hatching of about one week for some of the eggs that were laid on the same days. The first two instars are green with black (first instars) or brown heads (second instars), and like most satyrs they remained exposed on the leaves of the foodplants. (For additional early stage descriptions on this butterfly refer to Braby 2000.) The heads acquired a pair of horns from the second instar stage. The third instar was either green or brownish green, and the latter colour could either be acquired immediately after moulting or during the third instar growth period. From the third instar the pair of head horns became red coloured and tipped white. The fourth instar was pale brown coloured. Both third and fourth instar stages also had a dorsal and lateral (spiracles) row of black spots. The fifth (final instar) was mostly dark brown coloured, sometimes even blackish. Second instar and older larvae had a dorsal V shaped or overlapping diamond pattern, which was most obvious in the brown coloured larvae. When disturbed, the early instar larvae raised the anterior parts of their bodies and they would swing their raised heads back onto any small predator or disturbance that occurred along their bodies. Mature larvae would also sometimes raise the forward parts of their bodies and wriggle it when agitated. The latter larvae were also more prone to drop off the grass when disturbed. Once brown coloured, the larvae sheltered during the day near the base of the foodplants. Green coloured larvae and the pale-brown fourth instars would feed at any time during the day and night, whereas the fifth instars only fed at night, rising in the early evening to feed on the provided foodplant grasses. These grasses included *Themeda triandra* (kangaroo grass) and all the *Poa* species offered, and also the following introduced grasses, **Brachypodium distachyon* (false brome), **Cynodon dactylon* (couch), **Poa pratensis* (Kentucky blue-grass) and **Ehrharta erecta* (panic veldt grass). They would not eat wild oat or kikuyu. The larger larvae that were active at night readily moved from one plant to another. Most of the larvae matured very rapidly and reached a final length of about 26 mm. Larval pupations started on 13 January 2003 and most had pupated by mid February, although some stragglers did not pupate until early March. Pupation occurred mostly at the base of the foodplants, although some left the foodplants to pupate. The pupae lengths were 10-11 mm, and were variably coloured in shades of black and brown, sometimes with areas of grey markings on the wings and ventral side. They were very compact, tough and thick cuticled. (Adult eclosion for this species does not take place until the following spring, Braby 2000.)

A single new female *Paralucia aurifera* was collected to lay eggs in captivity. Egg laying on the foodplant *Bursaria spinosa* (Pittosporaceae) occurred over the period 12-16 November, and a total of 34 eggs were laid. These began hatching after 7 days. The first instar was pale greyish yellow coloured, with some reddish markings and a large dark brown prothoracic plate, and there were long white peripheral hairs and paired black recurved dorsal hairs. (For additional early stage

descriptions on this butterfly refer to Braby 2000.) The first instars were very mobile. It was also noticed that when irritated some young larvae would repeatedly thump their posterior ends on the substrate, presumably as a signal to other larvae or for the attendant ants (although none of the latter were present). These mobility and thumping features have also been noticed in other ant dependant butterflies to be found in the Luciini and Ogyrini Tribes. Most of the larvae matured very rapidly to about the fourth instar stage, then the growth rate tended to become variable. (Many of the larvae at this stage were returned to the colony area during a later field trip). Some of the remaining larvae continued to develop rapidly into the fifth instar stage reaching a final length of about 14 mm and started pupating on 4 January 2003. The remainder had a slow, staggered late stage development. All but one of the larvae had finished pupating by the end of January. The single straggler was still in the larva stage during mid-March. Larval feeding occurred at night, and the larvae assembled together and hid during the day. There was no evidence of cannibalism. The pupa period was 12-15 days for those that eclosed and the last flight (except for the straggler) was 14 February. The pupae lengths were about 9 mm. The length of the brood period would suggest that a second main flight would be possible in mid-Autumn.

Only one fertile egg could be obtained from the female *Pasma tasmanica*. Eggs had 15-16 vertical ribs. The egg colour was initially pale yellow, but after 24 hours the fertile egg laid on 15 November acquired some small orange-red apical spots and peripheral markings. The egg hatched on 23 November, and the larva immediately started feeding on the provided *Microlaena stipoides*. The first instar larva used a single leaf to make an open ended tubular shelter about 8 mm long, by rolling part of the leaf edges and continuously sealing the edges with silk. It then fed on the distal part of the leaf. The young larva rested in the shelter during the day with its head pointing towards the leaf tip. The first instar was initially pale yellow, but gradually turned green after eating the foodplant, and had a large shining rounded black head, the prothoracic plate was dark brown and the surrounding neck area was brownish. There were short setae on the body that were knobbed at the ends, and it did not have long recurved hairs posteriorly as most other related species possess. (For additional early stage descriptions on this butterfly refer to Atkins 1988.) The second and third instar stages were similar in colour to the first instar, but the former two stages made tubular shelters by folding over the leaf tip lengthwise upon itself and sealing the leaf edges with silk. The fourth instar stage was greenish red-brown coloured and still had a black head. At this stage the larva started making multi-leaved shelters, with an opening towards the leaf tips. The fifth instar stage was wine-red to red-brown coloured, and the head was large, rugose, dorsally furrowed, and black coloured with some brown markings. Feeding by the larva occurred at night, either during the early evening or late at night. The larva matured rapidly and reached a final length of about 20 mm. It pupated within its final larva shelter on the foodplant on 19 January 2003, and a male adult eclosed on 29 January. The pupa length was about 14 mm. The larva was reared on *Microlaena stipoides* and another grass tentatively identified as *Tetrarrhena* sp (Poaceae). The length of the brood period would suggest that a second main flight would be possible in mid-Autumn.

References

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Action Plan for Australian Butterflies

Ian Endersby
56 Looker Road Montmorency Vic 3094

"The Aetion Plan for Australian Butterflies" was launehed by Dr David Kemp, Federal Minister for the Environment, at the Butterfly House of the Melbourne Zoo on 27 February 2003. This 378 page volume was prepared by Drs. Don Sands and Tim New for Environment Australia and funded through National Heritage Trust grants.

The report reeognises 427 butterfly speeies for Australia but, when subspeeies and 'forms' are taken into aeeount, there are 654 taxa:

	No. species	No. taxa
Hesperiidae	124	190
Papilionidae	21	34
Pieridae	38	51
Nymphalidae	90	147
Lycaenidae	154	232
	427	654

Synopses are given for 220 taxa whieh have been deemed to be threatened, and threatening proeesses and populations at risk have been identified. This listing has been derived from previous assessments in the published literature and from workshops that were held throughout the eountry attended by professional and hobby lepidopterists. The proeess was unique in the degree of information provided by amateur butterfly enthusiasts.

IUCN eategories of threat were developed predominantly for vertebrates and rely very mueh on population estimates and the signifieanee and eauses of ehange in population numbers. This is a very diffieult proeess to translate into invertebrate eonservation beeause of the impossibility of making an aeeurate eensus and the diffieulties assoeiated with metapopulation dynamies. There are also the problems that larva and adult have different lifestyles and diapause or multivoltism eonfound the ealeulations. The authors have produeed a system whieh uses the same eategories of threat as those of the IUCN but they are developed from threats defined for the speeies, the number of populations at risk, and an estimate of the time to extinetion if the threats are not ameliorated. In order of severity the eategories are:

EX Extinct
CR Critically Endangered
EN Endangered
VU Vulnerable
LR Lower Risk
  cd Conservation Dependent
  nt near threatened
  lc least eoncern
DD Data Deficient
NCS No Conservation Signifieanee (at the National level but there might be State or municipal eoncerns).

There are individual assessments for 220 taxa whieh assign a risk eategory then diseuss distribution, taxonomy, habitat eritieal to survival, history of eonservation eoneern, major threatening proeesses, available knowledge, reeovery needs, and aetions required. For all but ten of the taxa a eost estimate is given for taxonomie and biologieal studies, distribution surveys and habitat restoration. No attempt has been made to inelude land aequisition eosts for reserves.

There are 15 species or subspecies considered threatened in Australia with another ten in the Lower risk categories and 45 for which data are insufficient to allow an assessment.

	Assessed	CE	EN	VU	LR	DD
Hesperiidae	71			4	3	12
Papilionidae	9					1
Pieridae	8					2
Nymphalidae	39	1		1	3	13
Lycaenidae	93	1	3	5	4	17
TOTAL	220	2	3	10	10	45

In addition there are 33 taxa which are Not of Conservation Significance for the Commonwealth but there are concerns at State or municipal level. The following table shows their distribution and some taxa are of concern in more than one State.

	SA	NSW	WA	QLD	VIC	TAS	NT
Hesperiidae	7	3			1		1
Papilionidae		1		1			
Nymphalidae	1			1			
Lycaenidae	1	4	6	3	3	2	1
TOTAL	9	8	6	5	4	2	2

Australia's threatened butterflies are:

Critically Endangered

Nymphalidae	*Heteronympha cordace wilsoni*	SA, VIC
Lycaenidae	*Ogyris subterrestris petrina*	WA

Endangered

Lycaenidae	*Candalides heathi* 'Wimmera'	VIC
	Hypochrysops piceatus	QLD
	Ogyris idmo halmaturia	SA, VIC

Vulnerable

Hesperiidae	*Anisynta cyone cyone*	SA
	Heromosa alboventa alboventa	SA
	Hesperilla flavescens flavia	SA
	Ocybadistes knightorum	NSW
Nymphalidae	*Oreixenica ptunarra* subsp.	TAS
Lycaenidae	*Acrodipsas brisbanensis cyrilus*	SA, VIC
	Jalmenus aridus	WA
	Ogyris subterrestris subterrestris	SA, VIC, NSW
	Paralucia pyrodiscus lucida	VIC
	Pseudalmenus chlorinda myrsilus	TAS

Nowhere in the report is the total budget given for recommended studies, surveys and restoration but the number is $2,369,300. This seems a moderate amount when compared with the Action Plan for Australian Birds which saw a need for more than $50 million over the next five years.

It is instructive to look at the funding needs in various ways: firstly by family and then by risk category.

	Taxa Costed	$'000	$'000 per taxon
Hesperiidae	30	550.3	18.3
Papilionidae	3	35	11.7
Pieridae	2	38	19.0
Nymphalidae	20	423	21.2
Lycaenidae	48	1323	27.6
TOTAL	103	2369.3	23.0

On average $23,000 should be spent on each taxon with the Lycaenidae being more expensive, possibly because that family includes flagship species and perhaps more site rehabilitation is included.

Viewing the costs for the various risk categories shows that the cost per taxon is higher for threatened species as would be expected as more of the habitat restoration and status change costs would be necessary for these groups.

	Taxa Costed	$'000	$'000 per taxon
CE	2	70.0	35.0
EN	3	160.0	53.3
VU	10	439.3	43.9
LR	10	396.0	39.6
DD	45	740.0	16.4
NCS	33	564.0	17.1
TOTAL	103	2369.3	23.0

The costs per taxon are as expected but more than half of the proposed expenditure is allocated to data deficient butterflies or those which have a risk threat at State or municipal level.

	$'000	%
Threatened	669.3	28
Lower Risk	396.0	17
Data Deficient	740.0	31
No Conservation Significance	564.0	24

Lack of knowledge is the obvious cause for the need for so many resources to be applied to testing whether data deficient species are at risk and to allot a significant part of the budget to those taxa is justifiable. It is more problematical to ask a federal funding body for a quarter of the budget to be spent on species that are not considered to be at overall risk in Australia.

Funding agencies need to make strategic decisions on the application of limited budgets to conservation needs. There are some nice decision theoretic models available to assist but they usually require some estimate of the probability of success. Fundamental philosophical questions need to be resolved about the taxonomic level and the relevance of cadastral borders to the need for prioritising conservation effort. Half of the taxa for which a cash allocation has been recommended are trinomials and these comprise 54% of the budget.

The top 19 butterflies constitute half of the recommended $2.4 million expenditure. In descending order they are:

NYMPH	*Tisiphone abeona morrisi*	NCS	QLD	$80,000
LYCAE	*Paralucia spinifera*	LR (cd)		80,000
LYCAE	*Paralucia pyrodiscus lucida*	VU		75,000
LYCAE	*Ogyris iphis doddi*	DD		70,000
LYCAE	*Candalides heathi* Wimmera	EN		65,000
HESP	*Heromosa albovenata fuscata*	DD		65,000
LYCAE	*Pseudalmenus chlorinda myrsilus*	VU		61,000
NYMPH	*Tisiphone abeona joanna*	LR (lc)		60,000
LYCAE	*Jalmenus evagorus eubulus*	LR (lc)		60,000
LYCAE	*Hypochrysops halyaetus*	NCS	WA	60,000
HESP	*Heromosa a. albovenata*	VU		60,000
LYCAE	*Acradipsas brisbanensis cyrilus*	VU		58,000
LYCAE	*Jalmenus notocrucifer*	DD		55,000
LYCAE	*Hypochrysops piceatus*	EN		55,000
LYCAE	*Ogyris otanes*	DD		50,000
LYCAE	*Ogyris s. subterrestris*	VU		50,000
LYCAE	*Jalmenus lithochroa*	LR (nt)		48,000
HESP	*Hesperilla f. flavescens*	LR (lc)		43,000
LYCAE	*Ogyris subterrestris petrina*	CE		40,000

Nine threatening processes have been identified which could have an impact on butterfly species and populations: Habitat destruction, Impacts of land management, Agricultural and forestry practices, Clearing/levelling hilltops, Pesticides, Weeds, Exotic arthropods, Climate change, Over-collecting. Each of these is discussed in the report with the most coverage being given to the issue of collecting. In essence the report concludes that in Australia collecting will rarely pose a risk to populations and the contribution of amateur collectors to the Action Plan has been invaluable. A Code of Conduct for collectors and conservation authorities and managers is presented and this Society should review and promulgate its recommendations.

The Action Plan for Australian Butterflies is the first for an invertebrate group in this country. It could not have been completed without the knowledge of local lepidopterists. As this is the most popular group amongst hobby naturalists it is doubtful whether any other terrestrial order could receive such a treatment given the paucity of specialist amateurs. The introductory sections of the Plan raise and attempt to address a number of issues of invertebrate conservation methodology and the authors are to be commended for producing this exemplary contribution. No doubt there will be criticism about particular decisions concerning favourite taxa or recommended financial applications but that is inevitable. The task now is to fill the knowledge gaps and to convince funding bodies that responding with alacrity is the only way to have some assurance that this best known group of insects will persist. The good news is that some of the management and site rehabilitation actions will also improve the lot of less charismatic organisms.

Painted Apple Moth (*Teia anartoides*) - Biocontrol Project for New Zealand

From 19th March till early May 2003, Pip Gerard, an entomologist from AgResearch and John Charles, an entomologist from HortResearch will establish a temporary base at the Institute for Horticultural Development, Knoxfield. They are searching for natural enemies (parasitoids and pathogens) of the painted apple moth (PAM) in Australia. Searches in PAM regions in Tasmania (commencing 1 April) and South Australia (commencing 11 April) will be carried out by two roving teams, while the base team will undertake the search in Victoria and rear out and identify PAM parasitoids and pathogens from all the samples collected.

Background to their project
PAM has arrived in NZ without its suite of natural enemies and is now recognised as a major threat to New Zealand forests, native bush and reserves, gardens and parks, and horticultural crops. Should the current eradication programme fail, biological control appears be the only tool possibly able to limit damage levels. The most likely sources of effective and highly selective biocontrol agents are PAM populations in regions of Australia with similar climate to New Zealand.

How can you help?
PAM infestations often reoccur at the same localities, so local knowledge appears invaluable. The PAM team would greatly appreciate help in identifying potential collection sites, information on local regulations and helping arrange permission for access from landowners. Any specimens, advice on collecting locations or help would be very welcome.

Contact details:
The PAM team is being hosted by Mali Malipatil, Greg Lefoe and Peter Ridland (Telephone 03 9210 9222).

Pip Gerard pip.gerard@agresearch.co.nz
John Charles charlesj@hortresearch.co.nz

What is Painted Apple Moth?
PAM is an Australian tussock moth. It is believed that *Acacia* spp. were its original host, but it is polyphagous and feeds on a range of plants, including apple!

What does it look like?
The larva is covered with brown hairs with four tufts of hairs on its back.

Collecting specimens
You may well see them in your garden. Be careful when handling the specimens; bring them in a small container with a twig of their feeding material.

If you want to know a little more of PAM in NZ, this site is quite informative

http://www.maf.govt.nz/biosecurity/pests-diseases/forests/painted-apple-moth/index.htm

Peter Ridland
Entomologist
Department of Primary Industries
Institute for Horticultural Development, Knoxfield, Victoria

Courtship refusal in *Toxidia doubledayi* (Felder) (Lepidoptera: Hesperiidae: Trapezitinae)

Kelvyn L. Dunn
e-mail: kelvyn_dunn@yahoo.com

Summary
This descriptive qualitative study documents five observations of courtship refusal in *Toxidia doubledayi* (Felder) in Victoria. All refusals took place at a foraging site where females were seeking nectar. Males consistently flew below and behind females in maintained aerial positions. Both sexes adopted a fluttery flight during courtship. Females seemingly refused their courtiers by adopting this fluttery flight, landing with closed wings, and ignoring male advances. Despite apparent refusal signals, males sometimes attempted genital contact. Females responded by departure or failed to accommodate the male to promote coitus. In this skipper there is an absence of a flutter response after landing, such as wing fanning, wing flicking or wing quivering, often seen in refusing females of other butterfly species (Dunn 1993, 2001; Scott 1973; Tennent 1987) including a congener (Dunn 1992). The significance of the refusal behavior in relation to *T. peron* (Latreille) and general butterfly behavior in the literature are discussed.

Preamble: why should we study butterfly courtships or allied phenomenology?
Qualitative research methods, such as descriptive studies of specific behaviors help us understand and communicate field experience common to observers of butterflies, rather than predict relationships between variables. A descriptive study should provide an outline of the basic activities at species level in the target activity. Numerical data, paramount in identifying related variables in reductionist quantitative science may not always assist in elucidating, correlating or extrapolating general trends in species behavior across broad groups or families, often determined intuitively when few examples have been previously described. When the broad trends are clear then quantitative studies testing the purpose of proposed signals or specific behaviors can become the focus for the rigorous positivist scientist. For the present, however, I proffer these and subsequent phenomenological field notes usually based on single observations rather than multiple samples. From these I suggest some general trends and signals, sometimes interpreted intuitively and experientially, in the hope of improving understanding and imparting aspects of my field experience to future readers interested in butterfly ethology. Indeed, it is possible that species' behavior may either prop or further question some unclear generic placements.

Observations
Locality: Churchill National Park, Victoria
Habitat: Thicket of *Kunzea* in woodland along the Channel Track (90m a.s.l.)
Date: 19 Dec. 2001
Weather: sunny, still. Temp.28°C
Times of recorded activities are given in both Australian Eastern Daylight Time (AEDT) and Eastern Standard Time (EST). Observations were documented in the field immediately following the events, and typed up contemporaneously - meaning the same day or soon as practicable thereafter.

Prelude: Several males were seen patrolling flowering *Kunzea ericoides* (Myrtaceae) thickets, and perching 2-3 metres up on the leaves and flowers of this tree. Some females were feeding periodically at its cream-colored flowers.

First courtship attempt
Time: 4:50pm AEDT (1550h EST) Temp. 28°C.

Male (medium condition) intercepted flying female (fresh condition). Male and female both adopted fluttery flight. Male fluttered below and behind female some 5-8cm away (hypotenuse with associated angle of about 45° below horizontal). Adults flew at variable heights ranging from near ground up to about two metres. Male pursued meandering female as she flew slowly back and forth for about two minutes (timed). During this time, female landed fleetingly seven times on *Kunzea* foliage, mostly about one metre up. Upon landing female remained on leaf fleetingly - just making tactile contact before taking off - to be slowly pursued by the male again. As female landed, male approached and either fluttered behind or sometimes attempted to land behind her, at which time the female departed each time. Courtship flight continued, and on three more occasions the female remained settled longer - for about two or three seconds (estimated) - each time with wings closed. Whilst landed neither sex gave a flutter response. On female's first lengthier landing, courting male settled with closed wings just to the left of female with his head level with her upper abdomen. Male then attempted to curl abdomen 180° to contact female genitalia and potentially copulate, but female took to flight before such contact occurred.

On second landing, same procedure occurred, but both adults also fed simultaneously at the flowering terminal heads of *Kunzea* on which they had landed. Whilst feeding, male's abdomen curled only partly around this time, but with some abdominal extension and contraction movements in a stretch-like behavior to seemingly attempt genital contact. No contact achieved once again, female's abdomen remained 4mm away. Male did not crawl forward to bridge genital gap but continued to feed.

On third landing, female again with wings closed fed at *Kunzea* flower. Procedure same as before, but male landed with wings closed, slightly lower on terminal flowering section with head level with her abdominal end. Male remained stationary behind and to the left of female and did not feed. No abdominal curling displayed by male. Female continued to feed at *Kunzea* flower, she did not fan her wings in male presence. Male opened wings to V-shape, departed flower flying about 30cm away then returned to land a fourth time behind female. Male remained for about a second then departed to pursue and challenge rival male entering territory. Female then flew 2-3 cm to yet another *Kunzea* flower and fed once again. The three lengthy landings and flights took a minute (timed), bringing total courtship session time to about 3 minutes (timed). Male did not physically contact female with antennae or other sensory body parts either during fluttering flight or after landing.

Second courtship attempt
Time: 4:55pm AEDT (1555h EST)
Male pursued meandering female over lengthy horizontal distance in flight, at about a metre above ground. Aerial courting time was estimated at between 30-60 seconds. Flight of both adults was fluttery and the same aerial positions of the sexes were adopted and maintained during courtship. Female did not attempt to land, and male quickly abandoned pursuit and departed area.

Third courtship attempt
Time: 5:00pm AEDT (1600h EST)
Third courtship very similar to first, with repeated brief landings and lengthy fluttery flight adopted by both sexes. Landed male, situated to left of female, remained for a few seconds then flew off without attempting any pre-copulatory abdominal curling; female remained with wings closed (no fanning signal given) for several seconds longer before departure each time. Neither fed during this courtship refusal. Courtship lasted one minute (estimated).

Fourth courtship attempt
Time: 5:03pm AEDT (1603h EST)
This courtship involved fluttery flight only (both sexes) - no landing by female. Male maintained standard aerial position (described earlier) behind and below female maintaining a constant distance (hypotenuse). Courtship estimated to have lasted about 15 seconds. Male then broke position and departed.

Fifth courtship attempt
Time: 6:00pm ESST (1700h EST). Temp. now 26°C
Female seen feeding at *Kunzea* flowers. Male approached and commenced fluttery flight below and behind her (in standard aerial position) whilst she fed. Female moved from flower to flower on terminal flowering head. Male followed realigning in standard aerial position, but did not attempt to land. Female maintained closed wings at all times never fanning (flutter response). Again male departed after an estimated 15 seconds of courtship.

Discussion
Interpretations from this descriptive research suggest the existence and use of multiple refusal signals in female *T. doubledayi* (Felder). These behaviours include the females' fluttery flight, wings held closed after landing, departure from a landing site when male attempts to land for advanced courtship, and her apparent failure to respond and copulate during the males' abdominal curling.

All observed courtships took place at a foraging site - a common location for insect matings (Thornhill & Alcock 1983), and courtship flights were lengthy, taking the best part of three minutes on one timed occasion. Males consistently flew below and behind the females and maintained these aerial positions once established. Both sexes consistently adopted a fluttery flight during courtships - an accepted refusal signal (Atkins 1988, Dunn 1992) - after which the female landed if the male maintained courtship pursuit.

The fluttery courtship flight of both adults intuitively suggests dispersal of pheromones occur prior to landing, particularly since some males departed at this time. Given the male flies beneath and behind her, the female is probably dispersing a heavy molecular refusal pheromone. By corollary, males may disperse a lighter molecular weight wooing pheromone from their androconial sex-brands, fanned upwards toward the female in order to solicit receptivity by olfactory cues - important senses in female choice (Silberglied 1984), albeit male butterflies would seem more visually attuned (Fordyce *et al.* 2002). There was no physical contact such as antennal dusting (Silberglied 1984) in this species.

Most females were courted in flight, but some were courted during feeding bouts. When females landed they maintained closed wings in response to male attention - another accepted refusal signal (Common & Waterhouse 1981) perhaps limiting male visual discrimination - and/or continued to feed if already foraging when inspected. In this regard, females of *Delias* (Pieridae) may similarly be harassed whilst foraging at flowers and likewise may continue to nectar seemingly oblivious to the male solicitation (Dunn 2002). Ignoring male solicitations might seem a refusal signal at face value, however in *Cressida* (Papilionidae) the male may even feed whilst carrying her during copulation (Dunn 2000), so continued foraging may be an overriding instinct and not strictly refusal or indifference to a courtier.

The refusal strategy of landing (with closed wings) after failure to deter him in flight may have dual purpose. In addition to potentially thwarting male visual recognition of her species (Fordyce *et al.* 2002), it might serve to reduce exposure to would-be predators otherwise attracted to a slow flying courting couple. In this regard, female butterflies are often reclusive in their habits (pers. obs.). And, there is some evidence that palatable butterfly females across two families (Papilionidae and Pieridae) are in fact selectively preyed upon by insectivorous birds (Ohsaki 1995) - reckoned a powerful driving force in the evolution of female-limited mimicry (Ohsaki 1995).

Persistence in males is favoured by natural selection (Scott 1973) and so the variable tendency to persist with even an unpromising courtship, and attempt to copulate with a refusing female, has evolved in this and other butterfly genera (Dunn 2001, 2002a; Rutowski 1992). Males of this species sometimes persevered to an unsuccessful attempt at genital probing with a refusing or indifferent female. Male *Papilio* (Papilionidae), for example, initially locate and grasp the female's abdomen using the mechanical sense of the genitalia aided by genital photoreceptors that subsequently confirm precision alignment (Arikawa *et al.* 1996), and a similar dual guidance system probably also exists in the Hesperioidea.

However, male failure to bridge the genital gap rather than mechanical alignment problems appears the physical reason why copulation failed on the second probing attempt. Perhaps some female accommodation or 'acceptance behavior' (Rutowski 1977, 1981 cited in Silberglied 1984) is necessary for successful coitus at the mechanical stage - hence females of *T. doubledayi* like *T. peron* (Latreille) (Dunn 1992) seemingly cannot be raped. Raping is, however, known among sphragis-producing species such as *Cressida* (Papilionidae) and *Acraea* (Acraeinae) (Orr 1988). Thus females can be very selective, and moreover, even female-mediated intra-specific sexual isolation, although imperfect, is known among sympatric ecological forms in *Eurema* (Pieridae) (Kobayashi *et al.* 2001).

In general, females of closely related butterfly species tend to resemble each other more than do males (Silberglied 1984), and in these two somewhat disparate species of *Toxidia*, apart from departure in physical wing size the upperside facies show only subtle differences (see Braby 2000 for illustrations). Even though female congeners may look alike, a recent morphometric study has confirmed that males of *Lycaeides* (Lycaenidae), for example, can detect subtle differences in wing pattern between sibling species in order to maintain mating conspecificity (Fordyce *et al.* 2002). Hence, in *Toxidia*, a somewhat heterogenous group (Braby 2000) comprising subgroups of rather similar looking trapezitine skippers, visual acuity and isolating refusal behaviors probably work collectively to reduce the likelihood of cross-matings between similar congeners in their areas of sympatry in eastern Australia.

Finally, the refusal behavior in *T. doubledayi* has many parallels with that described for *T. peron* (Dunn 1992). The male of neither species makes direct contact with the female during inspection. Males of both maintained similar aerial positions and the fluttery flights were adopted by both sexes. Females of both landed with closed wings, and likewise their males landed slightly behind and to the left side of the female. In *T. peron* the female fanned her wings twice to indicate refusal (Dunn 1992) - a parallel response was not seen in *T. doubledayi*. Also, the 'arcing flight' of the male reported in *T. peron* did not occur in *T. doubledayi*. If these isolated observations represent typical behaviors then female refusal in these two species differs despite some broad commonality. Braby (2000) has suggested *T. peron* is doubtfully congeneric, indicating alignment in a few characters with *Signeta*, a closely allied genus (Atkins *et al.* 1991). By corollary then, when details of refusal behavior in other *Toxidia* species are in time reported, *T. peron* may prove even more atypical of the group.

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The Australian Entomological Society publishes the *Australian Journal of Entomology* quarterly. The Entomological Society of Victoria is an affiliated society and will, in future, publish the contents of the Journal for the wider interest of its members.

VIEWPOINT

AN Andersen: Common names for Australian ants (Hymenoptera: Formicidae).

ECOLOGY

HC Proctor, KM Montgomery, KE Rosen & RL Kitching: Are tree trunks habitats or highways? A comparison of oribatid mite assemblages from hoop-pine bark and litter.

DJ Kemp: Visual mate-searching behaviour in the evening brown butterfly, *Melanitis leda* (L.) (Lepidoptera: Nymphalidae).

D Ward, P Honan & G Lefoe: Colony structure and nest characteristics of European wasps, *Vespula germanica* (L.) (Hymenoptera: Vespidae), in Victoria, Australia.

EA Jarjees & DJ Merritt: Development of *Trichogramma australicum* Girault (Hymenoptera: Trichogrammatidae) in *Helicoverpa* (Lepidoptera: Noctuidae) host eggs.

PEST MANAGEMENT

RA Vickers: Control of *Ichmeumonoptera chrysophanes* (Meyrick) (Lepidoptera: Sesiidae) by mating disruption in persimmons.

BIOLOGICAL CONTROL

REC McFadyen, M Vitelli & C Setter: Host specificity of the rubber vine moth, *Euclasta whalleyi* Popescu-Gorj and Constantinescu (Lepidoptera: Crambidae: Pyraustinae): field host-range compared to that predicted by laboratory tests.

MEDICAL ENTOMOLOGY

PA Turner: Relationship between age and colour of hatched eggshells of *Ochlerotatus vigilax* (Skuse) (Diptera: Culicidae) on an Australian saltmarsh.

JAL Jeffery, PA Ryan, SA Lyons, PT Thomas & BH Kay: Spatial distribution of vectors of Ross River virus and Barmah Forest virus on Russell Island, Moreton Bay,
Queensland

JAL Jeffery, PA Ryan, SA Lyons & BH Kay: Vector competence of *Coquillettidia linealis* (Skuse) (Diptera: Culicidae) for Ross River and Barmah Forest viruses.

SYSTEMATICS

LS Kimsey: New genus and five new species of heat-tolerant tiphiid wasps from Western Australia (Hymenoptera: Tiphiidae: Thynninae).

KR Norris: Synonymy, distribution and bionomics of the Australian blowfly *Onesia accepta* (Malloch) (Diptera: Calliphoridae).

PS Cranston, DHD Edward & LG Cook: New status, species, distribution records and phylogeny for Australian mandibulate Chironomidae (Diptera).

MORPHOLOGY AND PHYLOGENY

VV Grebennikov, A Ballerio & CH Scholtz: Larva and pupa of *Cyphopisthes descarpentriesi* Paulian (Coleoptera: Scarabaeoidea: Ceratocanthidae) and their phylogenetic implications.

BIOGEOGRAPHY

BA Franzmann: *Hippodamia variegata* (Goeze) (Coleoptera: Coccinellidae), a predacious ladybird new in Australia.

THESIS SUMMARY

DS Kent: Biology of the ambrosia beetle *Austroplatypus incompertus* (Schedl).

Book Review

Conservation of Birdwing Butterflies. Edited by Don Sands and Sue Scott. 48 pp. Published November 2002 by Science Communication and Education Service, Marsden, Qld.
Available from Ms Sue Scott, SciComEd Pty Ltd, 2 Emily Street, Marsden, Qld, 4132. Cost $ 22 plus $ 4 postage within Australia and $ 10 postage overseas.

This colourful, generously illustrated, booklet is designed for the interested public rather than professional entomologists but, while it addresses its primary readership most effectively, there is still a great deal of interest in it for the serious lepidopterist.

The core of the book consists of chapters on the following topics; the wider values of Birdwing conservation by Tim New, foodplants of Birdwings by Don Sands, community participation in the Richmond Birdwing conservation project by Sue Scott, the Paradise Birdwing by Brian Fletcher, conservation of Birdwings in Taiwan by Yaw-long Yang and Huai-Sheng Fang, and the Richmond Birdwing by Don Sands and Sue Scott.

The aspect of the book that I really appreciate is the detailed biology of both foodplants and birdwings given in a simple readable form. Don Sands' wide experience in biological control has fitted him to recognize that the small fascinating details of biology are essential to successful conservation but are so frequently overlooked.

In a society dominated by Government and Business' total preoccupation with money, the interest shown in Birdwing conservation by the community described here, should be an inspiration to us all.

This book is highly recommended to anyone with an interest in butterflies and their practical conservation.

E. D. Edwards.

THE ENTOMOLOGICAL SOCIETY OF VICTORIA INC.
STATEMENT OF RECEIPTS AND PAYMENTS
FOR THE YEAR ENDED 31 DECEMBER 2002

GENERAL ACCOUNT

INCOME Subscriptions			
Member 2001		16	
2002		1135	
2003		482	
2004		16	
2005		16	1665
Institution 2002		89	
2003		88	177
Donations			15
Brochure Mailout			50
Sale of Back Issues			26
Reimbursement of bank fee			10
			1943
EXPENDITURE			
Journal Costs			
Printing	980		
Postage	459		
Envelopes	141		
Labels	25	1605	
Lecture Room Hire		0	
Corporate Affairs Fees		33	
Aust Ent Soc Sub.		104	
Government Taxes		8	1750
SURPLUS/(DEFICIT) FOR YEAR			193
Add Balance brought forward from 2001			6195
Transfer to Term Deposit			(4000)
Balance carried forward to 2003			2388

LE SOUËF MEMORIAL FUND

INTEREST INCOME		
Treasury Corp. Victoria	126	
Commonwealth Bank Fixed Deposit	37	
Commonwealth Bank Savings Account	15	178
Less		
Award Expenditure	0	
Science Talent Search	60	60
SURPLUS/(DEFICIT) FOR YEAR		118
Add balance brought forward from 2001		1206
Balance carried forward to 2003		1324

STATEMENT OF ASSETS AT 31 DECEMBER 2002

GENERAL ACCOUNT

Bank Account	2388
Term Deposit	4000
Editor's Advance	104
Stock of Maps	40
	6532

LE SOUËF MEMORIAL FUND

Bank Account		1324
Fixed Deposit Stock		
Treasury Corporation of Victoria	1400	
Commonwealth Bank Fixed Deposit	1000	2400
		3724

Auditors Report:

I report that I have audited the 2002 accounts of the Entomological Society of Victoria, comprising the Statement of Receipts and Expenditure - General Account, the Statement of Receipts and Expenditure for the Le Souef Memorial Fund and the Statement of Assets as at 31 December 2002..

The audit procedure examined the account books and records of the Society, including bank statements. bank books and cheque books.

In my opinion the accounts are properly drawn up and accurately record the financial transactions of the Society. Further, the financial records of the Society are in accordance with applicable accounting standards.

S.J. Cowling
20 March 2003

EDITORIAL

This being my tenth year as Hon. Editor, I have elected to return the long standing custom of including an Editorial in the last issue of the term of editorship. I have not significantly changed the format of the news bulletin since taking over from Mali Malipatil in June 1993 as I feel it serves its purpose well in the present form. At times I have been frustrated by the poor quality reproduction of photos, most of which over the years deserved to be produced in better quality but were hampered by the basic, but cost effective printing process used. Of significance is the fact that all final versions of the news bulletin since 2001 have been submitted to the printers in PDF format. These means high quality 'exact' copies of recent issues of *Victorian Entomologist* are being electronically archived for posterity.

I thank all contributors, regular and occasional, for submitting their papers over the past 10 years. Nearly all have been submitted in electronic format making the editor's job less onerous. Of course, hand written or typed submissions are always welcome if this is the only format available to an author.

I thank my wife Susan for unfailingly hauling the copies to the post office for mailing and my two sons, Aaron and Cale who at times, help with the labour intensive task of inserting the news bulletin into the envelopes.

Ten years is a long time to hold a post such as editor and I have had great satisfaction in seeing the issues mailed out on time and the general high quality of papers published. I would encourage interested members to nominate for the position of Editor at the general meeting in April on the basis that I will give them all the support I can and assist them for the remainder of the year. It is now possible for interstate members to take on the Editors role given the prevalence of email in this age.

Daniel Dobrosak
Hon. Editor

OFFICE BEARERS

CONTRIBUTIONS TO THE *VICTORIAN ENTOMOLOGIST*

The Society welcomes contributions of articles, papers or notes pertaining to any aspect of entomology for publication in this Bulletin. Contributions are not restricted to members but are invited from all who have an interest. Material submitted should be responsible and original. The Editor reserves the right to have articles refereed. Statements and opinions expressed are the responsibility of the respective authors and do not necessarily reflect the policies of the Society.

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Contributions may be typed on A4 paper or *preferably* sent to the Hon. editor on an **IBM formatted disk in *Microsoft Word for Windows, WordPerfect*** or any recognised word processor software with an enclosed hard copy. Contributions may also be E-mailed to Internet address: **ddobrosak@mira.net.**

The deadline for each issue is the third Friday of each odd month.

The Society's Home Page on the World Wide Web is located at:

http://www.vicnet.net.au/~vicento/

ADVERTISING

The charge for advertising is $5.00 per half page.

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"The Entomological Society of Victoria - the past five years and the next five years".

Friday 16 May Council Meeting

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